The value of nature through an ecosystem service lens

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1 Introduction

1.1 Background

Halting the loss of biodiversity is one of the most important environmental challenges we face today. Although the importance of biodiversity for the functioning of ecosystems is widely recognised (see Balvanera et al., 2006; Cardinale et al., 2012), biodiversity continues to decline. Land use change, pollution and the exploitation of natural resources, fueled by processes of societal change, drive habitat loss and environmental degradation. Stressing the urgency of the problem, ecologists have warned that species go extinct at an exceptionally high rate (Butchart et al., 2010; Barnosky et al., 2011; Dirzo et al., 2014). As such, conservation action is increasingly called upon. Turning the tide of biodiversity loss is, however, by no means an easy task.

For long, the main strategy to ensure the conservation of biodiversity has been the creation of protected areas. Although setting aside nature for conservation as sacred groves is an ancient practice (see Chandrashekara and Sankar, 1998), the particular habit of nature conservation as we know it today emerged in the nineteenth century (Watson et al., 2014). In result to the increasing loss of nature that came with technological and economic development and a growing appreciation of nature as a place of beauty and awe, nature conservation was increasingly called upon (Ibid). During that time, the concept of nature was renegotiated and reframed. As Cronon (1996, p. 8-9) notes, in earlier times of American and European history nature was referred to as

> ' "deserted", "savage", "desolate", "barren" - in short, a "waste"...Its connotations were anything but positive, and the emotion one was most likely to feel in its presence was "bewilderment" or "terror"...Whatever value it might have arose solely from the possibility that it might be "reclaimed" and turned toward human ends - planted as garden, say, or a city upon a hill. In its raw state, it had little or nothing to offer civilized men and women.'

In the context of growing industrialisation, however, this idea of nature changed. Nature became the last remaining place where civilisation had not yet 'infected' the earth. Early environmentalists such as John Muir and Henry David Thoreau started to call for the protection of nature. What followed was a worldwide national park movement, rooted in the US, with the aim of setting aside areas for both nature conservation and (particular forms of) recreation, so that everyone could experience the beauty of 'wilderness' themselves.

Increasing concern over environmental degradation in the 1970s lead to a marked expansion of protected areas where 'species and ecosystems could be conserved from the rapid changes taking place elsewhere' (Watson et al., 2014, p. 67-68). The European Union (EU) for example, aiming

to commit to targets as specified by the Convention on Biological Diversity (CBD) in 1992, set forth an ecological network 'Natura 2000' to ensure the survival of habitats and species that represent European biodiversity. Through the Habitats and Birds Directives, upon which Natura 2000 is based, member states are obliged to designate and protect a network of habitats of European importance. As of today, 27522 sites have been designated as Natura 2000 (terrestrial and marine) amounting to almost 20% of land in the EU with a status of protection (EC, 2017).

Yet, the effectiveness of protected areas in halting the loss of biodiversity has been questioned (Rodrigues et al., 2004; Mora and Sale, 2011; Watson et al., 2014). Ecologists increasingly expressed concerns that protected areas on their own accord only form a minor contribution to the conservation of biological diversity as 'reserves are too few, too small, too subject to change to maintain areas large enough to uphold ecosystem function' (Goldman and Tallis, 2009, p.65). The location of such reserves also became contested, as species that occur in more productive landscapes are not protected (Margules and Pressey, 2000). Instead reserves are often located in places that do not pose a threat to human actvities but simultaneously do not properly represent biodiversity (Ibid). In addition, although the establishment of parks may be succesful to limit land clearing, effective management of biodiversity in parks is hampered by a lack of financial resources (Bruner et al., 2001; Leverington et al., 2010).

As questions arose about the effectiveness of protected areas for biodiversity conservation, the legitimacy of protected areas also became heavily debated. When first established, national parks were remote and primarily located in areas with little potential for economic use (Watson et al., 2014). The growing number of areas with a status of protection, however, increasingly gave rise to conflict as the establishment of 'strict nature reserves' posed problems for the communities living in or around protected areas. The implementation of Natura 2000 in the EU was met with severe resistance from farmers, fishermen and other local residents who saw their livelihoods change in result to decisions taken by distant experts (Grodzinska-Jurczak and Cent, 2011; Keulartz, 2009). Indeed, reporting results from a survey among 242 conservation professionals across the EU, Vassiliki et al. (2015) note that one of the most important issues hampering the implementation of Natura 2000 areas was thought to be the negative attitude against these areas displayed by local communities.

While the discussion about the legitimacy and effectiveness of protected areas continued, among conservationists the realisation grew that to achieve long-term conservation it was necessary to better integrate societal objectives with conservation efforts. Reconciling non-human species' needs with those of society was increasingly perceived to be a potential road for success as 'conservation strategies that incorporate human needs and human welfare with [biodiversity] preservation have the potential to engage a broader set of stakeholders, making conservation mainstream' (Goldman and Tallis, 2009, p. 66). Indeed Mace (2014) shows how conservation thinking has shifted from

predominantly framing the relationship between people and nature as destructive, necessitating efforts to protect nature *from* people, towards framing people as dependent on nature, necessitating efforts to protect nature *for* people. By emphasising the interdependency between people and nature, people are thought to be more likely to sustainably manage landscapes and be more supportive of nature conservation. Conservation efforts should thus no longer be solely aimed at excluding people from nature; they should increasingly be aimed at developing 'sustainable and resilient interactions between human societies and the natural environment' (Mace, 2014, p. 1559).

In order to account for both ecological and societal objectives in enviromental decision making, the demand for knowledge about how nature and people interact has grown. Environmental researchers and policy makers increasingly question what the societal importance of nature conservation is and how we can incorporate such 'social values' of nature into policy-making. No longer is it sufficient to answer questions of 'how' and 'where' to conserve nature on the basis of ecological expertise. If we aim at conserving nature for the benefit of people, thereby emphasising the instrumental value of nature, it means we should also ask when, where and how nature contributes to human well-being. As such, the EU Biodiversity Strategy to 2020 puts emphasis on both biodiversity *and* ecosystem services (see EC, 2011), reflecting 'the increased recognition of the value of biodiversity to society' (Hodge et al., 2015, p. 1000).

This thesis contributes to the growing demand for knowledge about the societal importance of nature conservation by studying public perceptions of the value of nature using an ecosystem services approach. Before outlining the specific aims of this thesis and the particular questions it addresses, I shall therefore briefly introduce the concept of ecosystem services.

1.1.1 Nature in service to human well-being: the emergence of a new concept

The shift towards a conservation strategy wherein the instrumental value of nature would play a larger role opened up space for research on ecosystem services (ES), which are defined as the benefits of nature for human well-being. The narrative underlying this concept, as coined and perpetuated by influential ecologists (see Westman, 1977; Ehrlich and Mooney, 1983; Daily, 1997), is that of nature as being indispensable to human well-being, an intricate relationship that hitherto has been seriously overlooked. Besides tangible resources nature provides services necessary to sustain our way of living, such as the pollination of crops by insects or the purification of air by trees. This calls for conservation action not only in the name of nature itself, placing emphasis on our moral duty to protect nature, but calls us to take action on nature if we want to do right by ourselves.

Although the framing of nature as a provider of services was perhaps not entirely novel, it particularly took flight at the start of the new millennium, when the Millenium Ecosystem Assessment (MEA) was released (see MEA, 2005). The MEA focused attention on the 'linkages between ecosystems and human well-being', which it named ES, to raise awareness about the notion that '[t]he human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services' (p. *v*). According to the MEA we were degrading our ecosystems rapidly, the costs of which were disproportionately borne by the poor. A high demand for particular ES, namely provisioning services such as food and timber, had come to the detriment of other services, so-called regulating and cultural services, upon which people also strongly depend (see Fig. 1.1). For example, agricultural production can, whilst providing food, also diminish the quality of waters surrounding the fields: an externality that can bring with it social costs that are currently not accounted for in the price of agricultural products. The hidden nature of such externalities meant that it had become too easy to harm ecosystems without being aware of the costs of doing so.

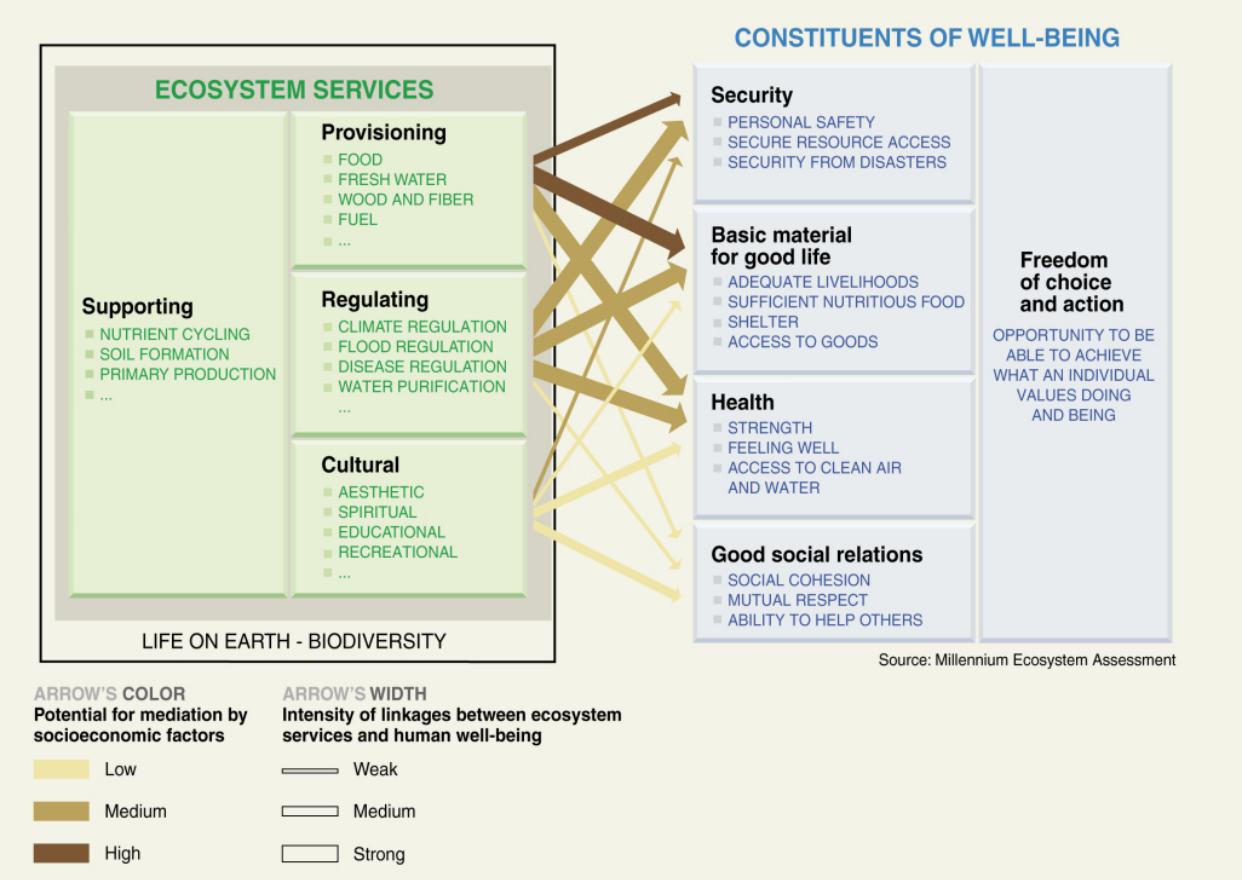

Fig. 1.1 The conceptualisation of ecosystem services under the MEA framework (MEA, 2005)

What was necessary to tackle this discrepancy were instruments that would provide better insight into - or perhaps better communicate - the linkages between ecosystems and human well-being, in particular instruments that would quantify the monetary benefits of nature conservation. The explicit valuation of nature should lead to a management of nature that is better informed by raising awareness about the 'hidden' social costs of environmental degradation and by forwarding the notion that the benefits of nature conservation may outweigh the opportunity costs associated with conservation efforts[1]. Indeed, as explained earlier, nature had often been thought to be worth very little, becoming valuable only once it is developed. As such, Costanza et al. (1997, p.255) argued in an (in)famous effort to value the world's ecosystems, 'one choice we do not have is whether or not to do [valuation]. Rather the decisions we make as a society about ecosystems imply valuations...We can choose to make these valuations explicit or not'.

1.1.2 The valuation of ecosystem services: renegotiating the meaning of value

As research on ES was initiated predominantly by economists and ecologists, the valuation of ES in the scientific literature focused much on monetary values. The problem forwarded by Gretchen Daily and Robert Costanza was that of nature as 'undervalued'; the solution to this problem is that of nature's values '[as] explicitly and systematically integrated into decision making by individuals, corporations, and governments' (Daily et al., 2009, p.22). This gave rise to a global initiative on 'The Economics of Ecosystems and Biodiversity' (TEEB, www.teebweb.org), under which a structured approach to economic valuation was proposed to include economic values of nature in environmental decision-making. As Laurans and Mermet (2014) explain, economic valuation can help to inform decision making processes directly by offering a solid framework through which the potential costs and benefits of a particular policy proposal are made explicit, but it can also serve to advocate the importance of nature by merely drawing attention to the notion that nature conservation has economic benefits. Furthermore, events like the Exon Valdez oil spill legitimated the use of economic valuation as it provided a method through which damage to nature could be quantified and attributed to those responsible for the damage. As such the economic valuation of nature became a tool to extend cost-benefit analyses to include a wider range of social costs and benefits (Balmford et al., 2002; Turner et al., 2003) and build evidence for 'damage assessments', 'environmental costing', and 'environmental accounting' (Navrud and Pruckner, 1997).

While the monetary valuation of nature became more common, however, it also became heavily criticised (see Spash and Vatn, 2006; Common, 2007; Kosoy and Corbera, 2010). Sharp cri-

[1] Opportunity costs are the foregone benefits associated with a particular choice. Imagine for instance that a farmer decides to revert part of his land to forest as he wishes to contribute to an ecological corridor, providing habitat for birds. The opportunity costs of this decision would be the loss of agricultural land available for the production of crops and the corresponding revenues.

tiques of economic valuation came from political ecologists who contested the frame of nature as a provider of services that can be objectified, quantified and substituted (McAfee, 1999; Robertson, 2012; Büscher et al., 2012). The representation of nature in monetary terms was therefore increasingly contested by those who were weary of this new way of conceiving of and dealing with nature. This also included scholars who warned that the dominance of monetary valuation in environmental research may silence other disciplinary perspectives on the understanding of values for nature. Indeed, Norton and Noonan (2007, p.655) express that the focus on economic tools has 'locked the rhetoric of environmental evaluation in a very monistic, utilitarian, and economic vernacular that leaves little or no room for other social scientific methods'. As such authors have increasingly warned that a pluralistic approach, accounting for multiple dimensions of value, is necessary when performing ES valuations (Kumar and Kumar, 2008; Spangenberg and Settele, 2010; Chan et al., 2012a,b).

In trying to look beyond economic valuation methods to value nature, researchers have sought alternative 'non-monetary', 'social' or 'cultural' ways of valuing nature that do justice to the multiplicit and contextualised nature of people-environment relationships (Chiesura and De Groot, 2003; Chan et al., 2012a; Raymond et al., 2013; Kenter et al., 2015). This has opened up a new discourse on value within the literature on ES, where value is to be more broadly interpreted to cater for both ecological notions of 'intrinsic values' and notions of human wellbeing beyond a narrow focus on utility. By widening the scope of the ecosystem service concept to include different notions of value, this discourse has been able to attract a large group of scholars that are willing to devote energy into valuing nature, albeit in non-monetary terms (e.g. Agbenyega et al., 2009; Martín-López et al., 2012; Casado-Arzuaga et al., 2013). Although these scholars are differently critical about the use of monetary valuation, they have nevertheless joined forces to draw attention to the 'intangible' and 'immaterial' aspects of nature that have thusfar been neglected in research on ES. This has given rise to a growing scholarship within the ES domain that practice the 'socio-cultural' valuation of ES. In consequence, frameworks that aim at operationalising ecosystem service valuation now commonly refer to 'ecological', 'economic' and 'socio-cultural' values (see Arias-Arévalo et al., 2018; Pascual et al., 2017; Jacobs et al., 2016).

1.2 Problem statement and research objectives

The focus of this thesis is on the socio-cultural valuation of ES as a way of gauging the *public perceptions of* the value of nature. Stressing the importance of accounting for people's values for nature in environmental policy and practice, a wide range of valuation methods have been forwarded to study socio-cultural values within the ES domain. This with the aim of providing

practical advice on how to include socio-cultural values in environmental decision-making. Along similar lines, the project of which this thesis is part (OPERAs, EU 7th Framework Programme http://www.operas-project.eu) aimed to explore how the concept of ES 'can move beyond the academic domain towards practical implementation in support of sustainable ecosystem management'.

The implications of using an ES approach to gauge socio-cultural values for nature, however, are currently not well understood. Given the focus on 'how to value', conceptual and methodological guidelines are increasingly forwarded in an attempt to provide direction to the rapidly growing body of research on ES, without putting these methodologies to much critical scrutiny. The critiques that have been forwarded about ES valuation have, as argued in the previous section, predominantly focused on the monetary valuation of ES. As such, Gsottbauer et al. (2015) call for a 'fair, constructive and consistent criticism of all valuation languages'. This makes it relevant to question not only how we can measure the societal importance of nature, but also what happens when we do so in a particular way.

Furthermore, the theoretical and methodological underpinnings of research on socio-cultural values are widely divergent (Tadaki et al., 2017). This is exemplary of the larger ES domain, where no agreement exists on how the concept should be implemented (Dempsey and Robertson, 2012; Barnaud and Antona, 2014). Tadaki et al. (2017) note that debates about environmental values are 'perplexing', making it difficult for environmental practitioners and decision makers to enhance their understanding of what socio-cultural values are and how they should be interpreted. The main objective of this thesis is therefore twofold: to investigate how socio-cultural values for nature can be understood and to reflect upon the use of an ES approach to study such values. The following research questions are posed to contribute to this aim:

RQ 1: How can socio-cultural values for nature be conceptualised?

RQ 2: How do socio-cultural values for nature differ across and within geographical contexts?

RQ 3: What can we learn from the operationalisation of an ES approach as an instrument to gauge socio-cultural values for nature?

1.3 An interdisciplinary approach

To answer the research questions specified above, I predominantly draw from the field of environmental geography. Following Castree et al. (2009), environmental geography : a.) includes 'any form of geographical enquiry which considers formally some element of society or nature relative

to each other' (p.6), b.) does not serve as the middle ground between physical and human geography in a symmetrical sense (meaning that it should not necessarily equally draw from physical and human geography), and c.) draws heavily from other disciplines, such as ecology and economics, and therefore is inherently interdisciplinary. These principles may give environmental geography a bit of an 'everything but the kitchen-sink' quality; a criticism many geographers will know all too well (see Lau and Pasquini, 2008). However, it is precisely this heterodoxy that makes that environmental geography can function as a place where 'it is possible to find social science, humanities and physical science perspectives on the environment rubbing shoulders' (Castree et al., 2009, p.8). As such, environmental geography is well suited to study how enviromental scientists may support the practical application of ES as a "language" for environmental protection (Portman, 2013).

Despite this breadth, however, a geographical enquiry specifically requires to study the socio-cultural values for nature within their social *and* spatial context. As Bickerstaff (2004) notes, a socio-cultural analysis of public perceptions should be aimed at recognising and accounting for the *different* ways people frame and understand environmental problems (Ibid). Combining such an understanding of socio-cultural values for nature with the understanding that such differences are necessarily spatialised, this thesis therefore takes a particular approach that recognises socio-cultural values for nature may differ across and within geographical contexts (as also reflected by RQ2). It is assumed that such an approach will lead to a better understanding of how people value nature.

Furthermore, it is important to note that this thesis (as reflected by RQ 1 and RQ 3) explicitly aims to tack back and forth between conceptualising and operationalising socio-cultural values for nature, in order to be open to multiple ways of defining value and keep track of how 'operationalised' ES schemes to measure such values impact our understanding of these. Although one may superficially conceive of socio-cultural values for nature as the way in which people themselves perceive the value of nature, the study of socio-cultural values requires us to more specifically define what the characteristics of such values are in order to find a suitable instrument to study them. Indeed, in trying to operationalise concepts we often further specify these in the search for an appropriate indicator that tells us something about them. This is very much a balancing act between complexity and simplicity, whereby the trick is to keep an eye on the extent to which the indicator still reliably tells us something about the phenomenon we aim to study.

This thesis therefore studies socio-cultural values from different angles: by engaging with such values theoretically and empirically through the use of an ES approach. The focus on the practical application of ES assessments forms a core part of this thesis because, as Kwan (2002, p. 262) notes (in reference to the practice of GIS), 'change will not occur through trenchant critiques alone, but through everyday struggle with the technology' (p.262). By trying to operationalise the ES concept

this thesis should speak to both ES advocates and critics: the former because the evaluation of the ES concept in this thesis stems from the experience I gained by 'getting my hands dirty' and the latter because through this same engagement I am able to reflect upon the social practices that form part of an ES exercise. As such this thesis aims to contribute to the dialogue between advocates and oppononents of the ES concept.

Before turning to the specific outline of this thesis and addressing the particular chapters of which it consists, however, it is necessary to briefly define what is meant by an ES approach. This is particularly relevant because one may question the extent to which a universal 'ES approach' exists: indeed several scholars have shown that the work on ES has become increasingly diverse (Dempsey and Robertson, 2012; Barnaud and Antona, 2014). Yet, acknowledging that the implementation of the ES concept is widespread and variegated does not make it impossible to distill certain elements that have *dominated* the general discourse on ES. In so doing Kull et al. (2015) identify four main elements of an ES approach, which closely resemble the often used 'ES cascade' as developed by Haines-Young and Potschin (2010) (see Fig. 1.2): (a) something out there (e.g. ecosystems, nature), (b) provides things (e.g. goods, services), (c) useful to people and/or nature (e.g. livelihoods, species) and (d) this should be valued. Although scholars may disagree about the definitions of these particular elements (e.g. Do we speak of monetary or non-monetary values? How do we measure these? Can we speak of a service if no *human* beneficiaries can be identified?) we may still recognise these elements as key to the ES approach.

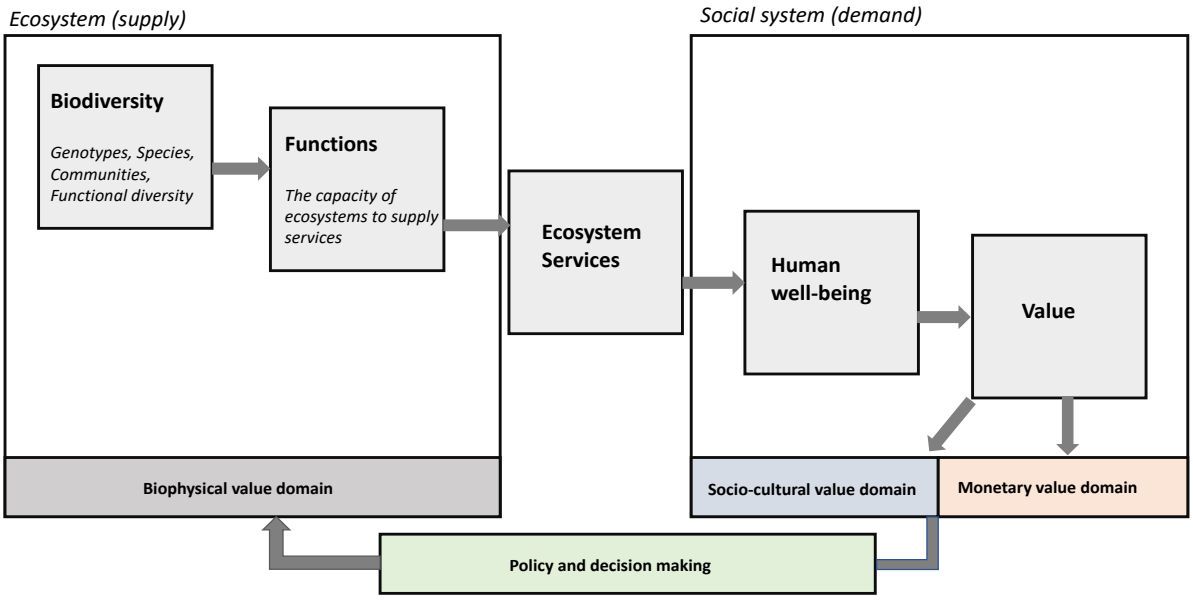

Fig. 1.2 The ecosystem services cascade. Adapted from Martín-López et al. (2014) and Haines-Young and Potschin (2010)

1.4 Thesis outline

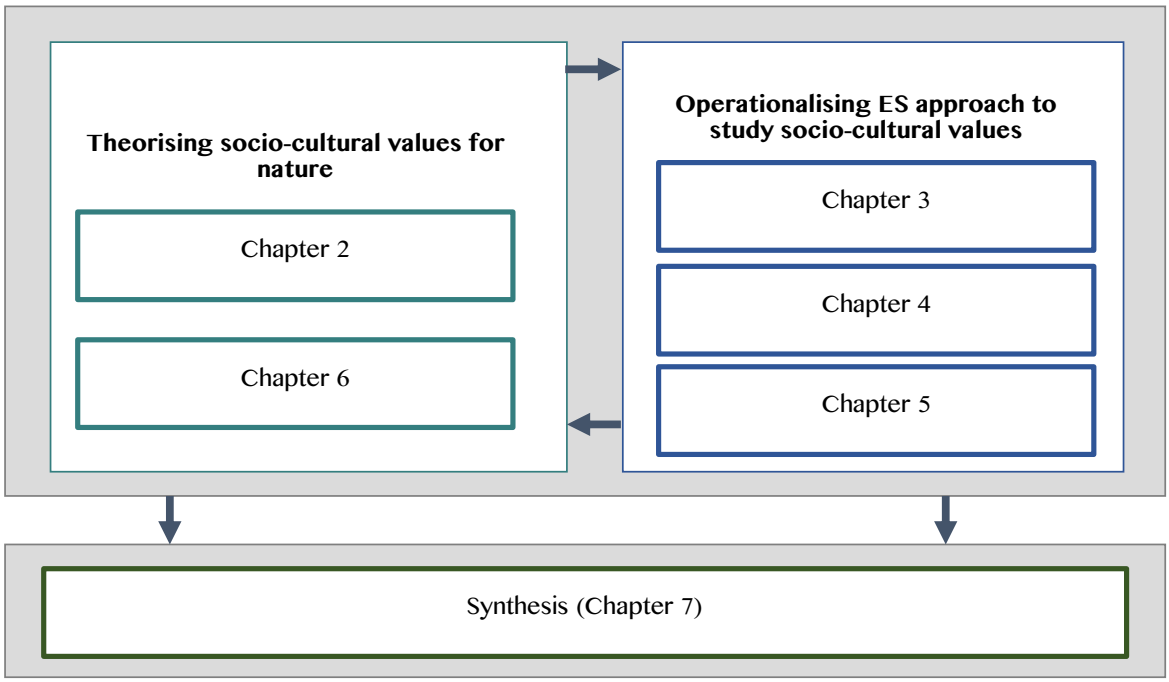

Fig. 1.3 Outline of this thesis

This thesis consists of 6 chapters in addition to this introduction (see Fig. 1.3). Chapter 2 gives a broad overview of how socio-cultural perspectives may be integrated into ES valuation. It firstly reviews how socio-cultural values in the ES domain can be understood by looking at value concepts that have been offered in different research disciplines. It consequently describes how attributes of the physical environment, attributes of the social environment and interactions between these, shape socio-cultural values. Furthermore I review the ES literature specifically to analyse what methods have been forwarded to study socio-cultural values for ES.

In chapters 3, 4, and 5 I operationalise the ES approach to study socio-cultural values for nature across three different contexts. Chapter 3 presents a study on how awareness of ecosystem functions and environmental practices are related to public perceptions of the value of wetlands. Taking together different dimensions of value I explore how environmental perceptions of fishermen, farmers and residents may explain support of wetland restoration along the Lower Danube in Bulgaria.

In Chapter 4 I look into the notion of offsetting, as a policy intervention to mitigate the harm

caused by development by restoring habitat elsewhere, from an ES perspective. Although much has been said about offsetting from an ethical standpoint there has been very little empirical research into the notion of 'No-Net-Loss' as perceived by local communities, while these are central in applying a no-net-loss principle to ES. Chapter 4 therefore specifically looks at how residents view the substitutability of nature, as advocated by a 'No-Net-Loss' approach. Given the focus on trade-offs in this chapter, I draw from the literature of environmental economics and employ a choice experiment to investigate whether residents across an urban-rural gradient in Scotland are themselves willing to 'offset' environmental impacts caused by urban sprawl through woodland restoration.

In Chapter 5 I reflect more specifically on the spatial context of socio-cultural values for nature, in particular in relation to the mapping of nature-based recreation. Defined as a 'cultural ecosystem service', nature based recreation is commonly mapped by looking into what makes land suitable (i.e. its perceived attractiveness) for recreation. Experts may do so on the basis of a set of ecological and socio-economic attributes, but this need not resemble public perceptions of attractiveness. Making use of an online participatory mapping tool (named the Hotspotmonitor) I study the perceived attractiveness of nature by looking into scale, interregional differences and the influence of physical attributes.

Having made several attempts at operationalising an ES approach to study socio-cultural values for nature, chapter 6 revisits the conceptualisation of socio-cultural values. It delves deeper into the debates about ES valuation and explores how diverging notions of value give rise to tensions in ES research. In response to the growing skepticism against monetary valuation and a call for 'value pluralism', ES researchers increasingly adopt notions of value that go beyond a strict economic interpretation but do so in different ways. This chapter aims at exploring this diversity by looking into the potentially contested nature of socio-cultural values.

Coming to terms with the heterogeneous nature of socio-cultural values for nature, Chapter 7 offers a synthesis of the findings forwarded by previous chapters and revisits the research questions outlined above.